

USE OF THE LIFE-CYCLE CONCEPT IN OPERATION OF GOODS-CARRYING VEHICLES

ZHANBIROV JH. G¹, KOBDIKOVA P. M² & TURSymbekova Z. Zh³

¹Doctor of Technical Sciences, Almaty, Dzhandosova 60. Central-Asian University, Tekeli, Kazakhstan

^{2,3}Research Scholar, Associate Professor, Almaty Dzhandosova 60. Central-Asian University, Tekeli, Kazakhstan

ABSTRACT

The report consists of the summary, keywords, introduction, contains 7 pages of the typewritten text, 1 table, 3 figures, includes the 4names of the used literature.

KEYWORDS: Truck, Life Cycle, Operation of Cars, Work Planning, Vehicles, Park of Cars, Standard, Operation Term, Wear of Details, Market of Cars, Transport Services

INTRODUCTION

In the report are given, on the basis of the quantitative and qualitative analysis structure of RK Vehicles Park, ways of use of life cycle of trucks in the Republic. Methods of scheduling of trucks offered in the report, allow to use as much as possible all technical and operational capabilities of concrete make of the car.

As of January 1, 2010, the National motor-vehicle fleet of the Republic of Kazakhstan consists of 1,745K cars, about 312K trucks и 75K busses. The auto fleet is characterized by a heavy wear - percentage of transport vehicles in more than 12 years' operation amounts to 63%, including 57% of busses, 59% of cars and 84% of trucks.

After analyzing the state of the auto fleet based on such characteristics as country of manufacture and year of output, it should be noted that most of the available vehicles are manufactured in the CIS countries (67% or about 80,170 items), the vehicles manufactured in foreign countries make 33% (39,356 items) (Figure 1). [1]

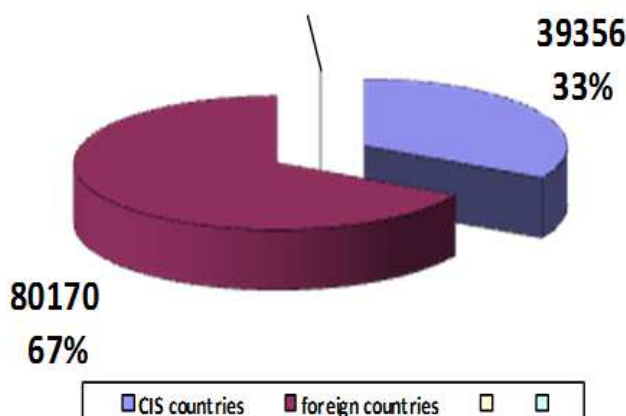


Figure 1: Structure of the Motor Vehicle Fleet Owned by Households of Cities with a Population of 70,000 People or More in Central Macro Region of the Republic of Kazakhstan, by Regions of Manufacture(Number of Vehicles, %)

The projected sales volume of vehicles manufactured in the CIS countries is estimated at 6,618 items, of which one half (3,309) is made of new vehicles and the other half - of used cars. In particular, the 2009 production of trucks by

the Russian automotive industry amounted to 91,4K cars (35,7% of the 2008 production). The 2009 production of foreign brand truck vehicles amounted to 7,4 K vehicles (40,6% of the 2008 volume), that makes 8,1% of the overall production of goods-carrying vehicles. [2]

The «Requirements to motor vehicles safety» technical regulation approved by the Decree #675 of the Government of the Republic of Kazakhstan dated 9 July 2008. The specified technical regulation, on a par with its Russian equivalent, is based on the international instruments but differs in the level and quantity of requirements. In addition, the technical regulations stipulate the use of certificates of compliance with the EU Directives.

The phased introduction of Euro standards will limit the import of old vehicles, improve the competitiveness of the Kazakhstani automobile assembly plants, as well as improve the quality of produced and imported fuel. On the territory of the republic, the Euro-2 standards for vehicles have been introduced as of July 15, 2009, and Euro-2 standards for fuel – as of January 1, 2010. The Euro standards with higher requirements to harmful emissions will be introduced in the following terms: [3]

Euro-4 standards – as of January 1, 2014.

Thus, by 2015 it is planned to reduce the number of transport vehicles in operation for more than 12 years from 63% to 35%.

These measures restrict the importation into Kazakhstan and production in the territory of republic of the vehicles that do not comply with the Euro standards, which will create conditions for renewal of the existing fleet of vehicles.

Table 1: Transport Means Separation by Useful Life of the Vehicles

Types of Transport	Allocation (Separation) by Useful Life				Total
	Under 2 Years	2 to 7 Years	7 to 12 Years	More than 12 Years	
Cars	86 086 (5%)	207 856 (12%)	420 589 (24%)	1 030 542 (59%)	1 745 073
Trucks	15 963 (5%)	18 716 (6%)	15 429 (5%)	261 720 (84%)	311 828
Buses	6 127 (8%)	16 733 (22%)	9 723 (13%)	42 459 (57%)	75 042
Total	108 443 (5%)	243 093 (11%)	441 768 (21%)	1 338 639 (63%)	2 131 943

In addition, we note that 15 state standards developed by RK as part of harmonization of the technical regulatory framework in the environmental safety sector in 2008-2009. Since modern vehicle is a complex system, an assembly of inline elements – components, providing performance of its functions, and made of different materials, with high accuracy of workpiece surface finishing. The vehicle operation is carried out in various road and weather conditions due to the influence on it of different mechanical, physical and chemical factors that lead to changes in its technical condition.

Here are some of the main causes of parts failure and resources depletion. Each detail has its own service life, 50,000-100,000 kilometers on the average, depending on spare parts, manufacturing company and driving style. The main reasons of failure and wear and tear of parts include the following:

- Improper parts installation;
- Careless driving style;

- Sharp pounding;
- Sagging shock absorbers;
- Sagging springs;
- Late change of oil and other technical fluids;
- Late change of filters and other spare parts;
- Rare joint greasing;
- Unsuitable and poor quality gasoline.

A timely detection of worn parts and components and their replacement with high-quality consumables and spare parts – these steps not only save time and money but also serve as a prerequisite for security. For example, as of the beginning of 2010, 1436 transport vehicles fall to the share of one operating service maintenance enterprise in Russia. In the European Union, this figure is equal 586, but in general the calculated value lies at the level of 750 units of the motor-vehicle fleet. In the context of the Republic of Kazakhstan this figure lies within 1850-1900 units, so we experience more than three times the lack of technical service companies in the Republic of Kazakhstan. Based on these facts, it can be stated that operation management of transport means in good technical condition requires a radical reform since the lack of specialized service stations can result in serious infrastructural constraints in development of the Kazakhstani economy. The problem of providing of transport means with quality and timely maintenance and repair enters the critical level and represents an obstacle to the development of the republic's motor vehicle market.

On the other hand, the current economic situation in the country requires from the Kazakhstani industrial enterprises the development of a new strategy, the use of which should ensure not only their survival but also increase the competitiveness of innovative technologies and products in the domestic and foreign markets.

Operation period or life cycle of a truck is the time of effective use of the truck in the transport market, that is, the time from the start of the vehicle's operation and up to the time of its write-off or sale in its original appearance [4].

Typically, life cycle includes four stages (phases):

- Market research by selection of brands and types of truck.
- Acquisition and running (introduction into the market).
- Vehicle's operation by maintaining its technical condition.
- Write-off and disposal.

The life cycle of a truck can be represented as a classical curve (Figure 1) which includes distinct periods of acquisition, running, operation via maintenance of the vehicle's technical condition and write-off and disposal.

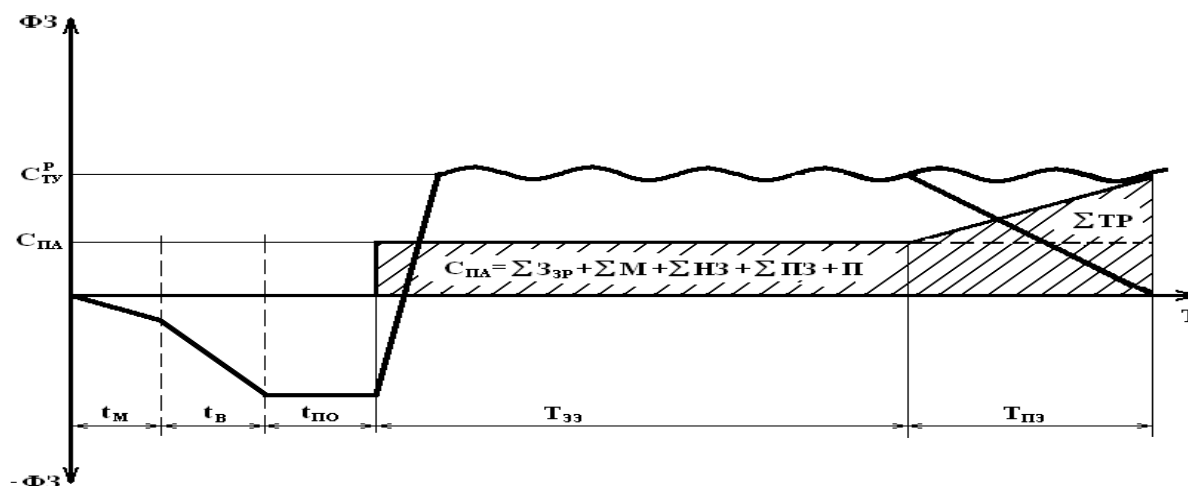


Figure 1: Classical Curve of the Truck Operation Life Cycle

C_{TV}^P - market value of transport services; $C_{\Pi A}$ - traffic handling cost based on certain vehicle brand, KZT/hr, KZT/tkm; t_M - marketing research time; t_B - vehicle's brand and type selection period; $t_{\Pi O}$ - acquisition and running duration; $T_{ЭЭ}$ - a period of effective operation; $T_{\Pi Э}$ - a period of operation of worn vehicle; $\sum TP$ - a sum of expenses to repair a vehicle.

The classical curve describes operation of the life cycle of conventional truck brands ensuring stable periodic maintenance and repair within a long period of time ($T_{ЭЭ}$). Figure 2 shows a schematic diagram of the use of financial resources of transport enterprises involved in the provision of transport services.

The first curve $\Phi 1$ is the cost of marketing research on the market demand and selection of brands of the goods-carrying vehicles. The second curve $\Phi 2$ is the cost of acquisition and running of the selected truck brand, i.e. costs of preparing and running of the selected for operation truck brand. If, in a certain period of time, ($T_{ЭБ}$) the operation of a particular brand or type of truck vehicle loses all its expediency, i.e. the transport enterprise would not receive the expected income from operation, this vehicle (T_y) will be written off or sold for parts.

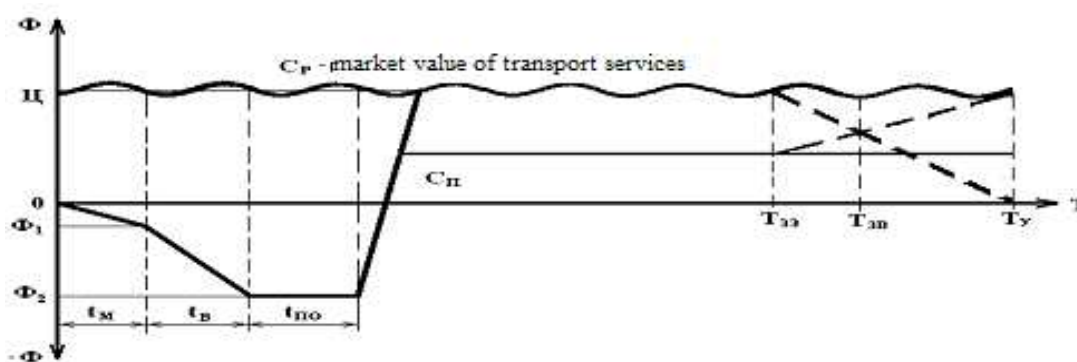


Figure 2: Schematic Diagram of the Use of Financial Resources of Transport Enterprises Involved Into Provision of Transport Services

$T_{ЭБ}$ - the period of forced operation; T_y - the period of operation expiry and disposal; C_{Π} - base cost of

transport services of acquired truck vehicle, KZT/hr., KZT/tkm; C_p - cost of maintenance and spare parts, KZT; Φ_1 - cost of market research, KZT; Φ_2 - cost of acquisition and running of truck vehicle, KZT.

During the truck vehicle operation, the management of transport enterprises should use all the technical and operational capabilities of each particular truck brand provided by the manufacturer. Upon precise observance of operating conditions of all units and mechanical devices of a particular vehicle using all technical and operating capabilities, the return on investment would depend on the tariffs and market value of transport services. Therefore, when selecting the truck brand one should consider the consumers' solvency, approximate volume and duration of road haulage.

One should also note the approach used by entrepreneurs and companies where the market value of transport services is determined at an early stage and is based on consumer's understanding and on a quality analysis resulting in the price range ($C_p - C_b$) to offer transport services at (Figure 3). As seen in Figure 3, prior to the brand selection and truck acquisition, it is advisable to explore on and determine the market value of transport services.

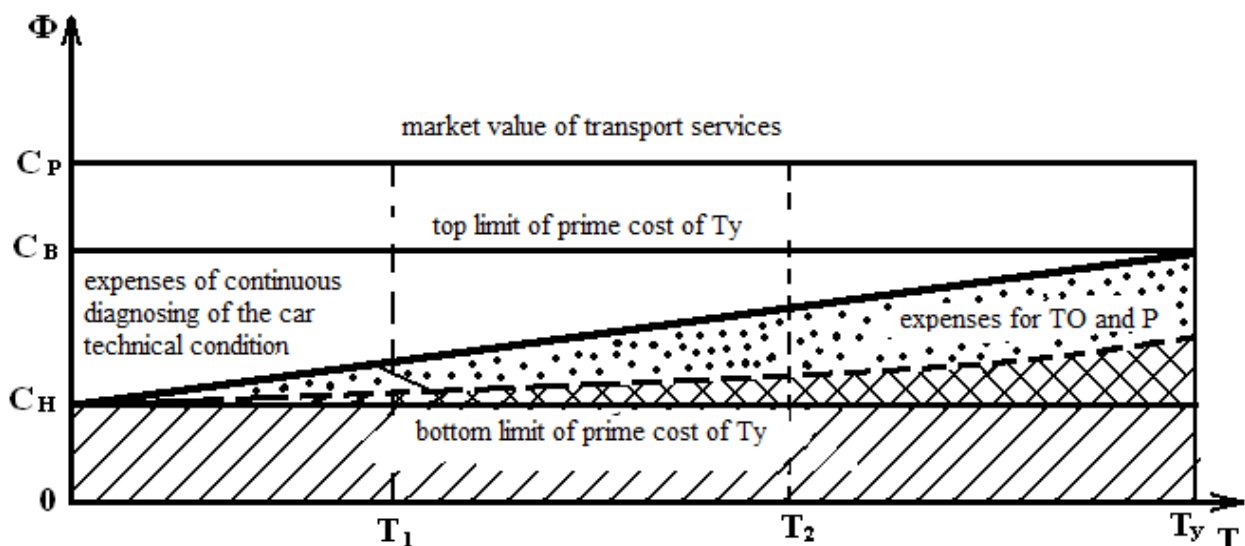


Figure 3: A Scheme for Determining the Profitability of the Acquired Truck Vehicle

T_1 - the period of maximum profit; T_2 - the period of profitability recession or increase on investment in to the vehicle's repair and maintenance; T_y - operation's financial insolvency; $C_B - C_H$ - fluctuations in base value of transport services.

On the basis of determination of the limit value fluctuations in the cost of transport services, it is necessary to select the appropriate brand and based on financial needs of transport enterprises determine the target profitability of the project. So, in reverse order, target costs are determined for the acquired vehicle and provided transport services. And only after that one should plan for the acquisition to be included in the scope of target costs. This process is accompanied by a significant number of negotiations between the various and regular customers of transport services and regular shippers. As a result, at the output into the market, there are goods-carrying vehicles which not only meet the needs of the shipper and the consumer but are also in the lead in line of high costs. Another difference between Western and Japanese approaches is the "go - no go" decision-making that is based on the expected profitability. Western companies usually reject the goods or service, the evaluation of which is based on the profitability planning of individual product or service.

Often it turns out that the calculation of the expected profitability is no more than a fiction which is based on inaccurate forecasts of costs and revenues. Japanese firms prefer to look at the situation as a whole, seeing the possible contribution of goods or services into strengthening of overall strategic position of the company.

Under conditions of market volatility and depending on various social-economic and political situations, many companies choose a strategy of rapid profit earning (O-T1 Figure 3). To do this, company managers can identify and set upper and lower levels for each of the marketing variables – price, promotion, distribution, quality and volume of transport services. Taking into account only price and promotion, the market entry strategy can be specified by using the “commodity price – cost of promotion” matrix. The rapid profit strategy is appropriate to apply when the bulk transport users have little idea about the transport conditions, the cost and the route.

It is necessary to apply the slow profit earning strategy (T2-Ty) when operating the goods-carrying vehicles requiring high costs of maintenance and repair, as it contributes to the maximum possible gross profit derived from each carriage and performed transport services. It makes sense to apply this strategy in cases where the order quantity is small but it is essential and therefore most potential customers are aware and willing to pay a high price.

The duration of each vehicle's life cycle as a whole and its individual phases depends on the vehicle's technical condition and the market demand, as well as on the operation's conditions. On the other hand, it is difficult to use the life-cycle concept of goods-carrying vehicles in the development of transport enterprise strategy on the effective use of each brand and particular truck, because provision for high-quality fuel and spare parts is both a cause and a consequence of the life cycle of truck vehicle.

CONCLUSIONS

The analysis showed that the most part of available cars of CIS countries production (67% or about 80 170 pieces), 33% (39 356 pieces) make cars of foreign countries production. At the same time in the Republic works, based on the international documents, technical regulations which provide certificates use of conformity to EU Directives. Therefore, during truck operation managers of the motor transportation enterprises have to use as much as possible all technical and operational concrete make capabilities of the car.

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